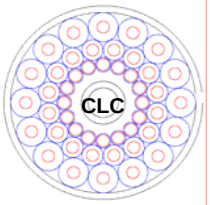

Updates on CDF luminosity

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Joint Luminosity Meeting 08/16/06

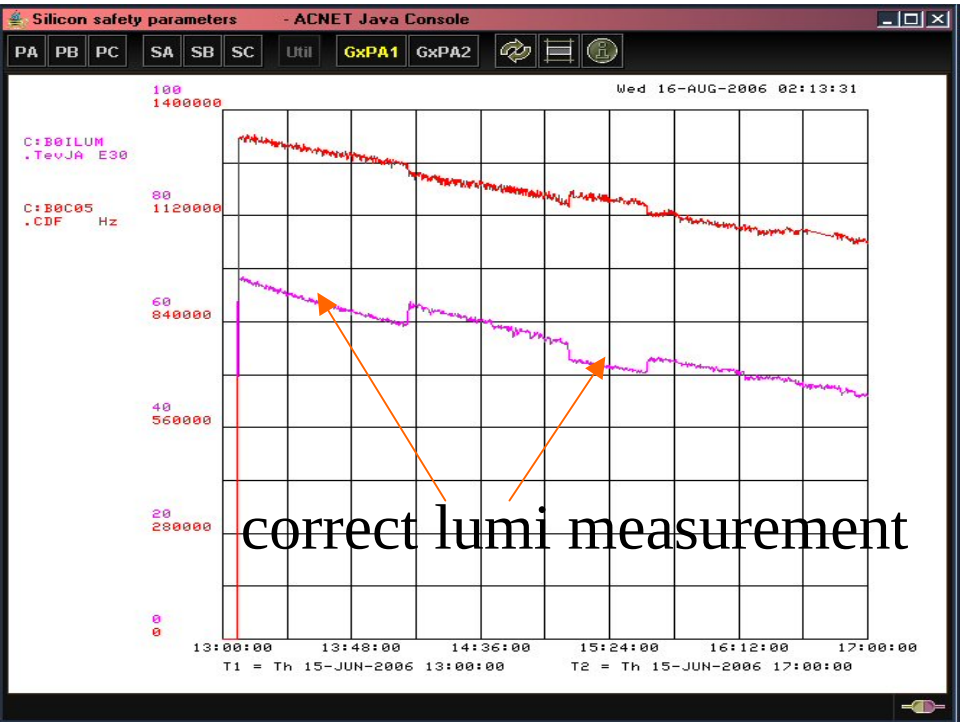
Luminosity after shutdown

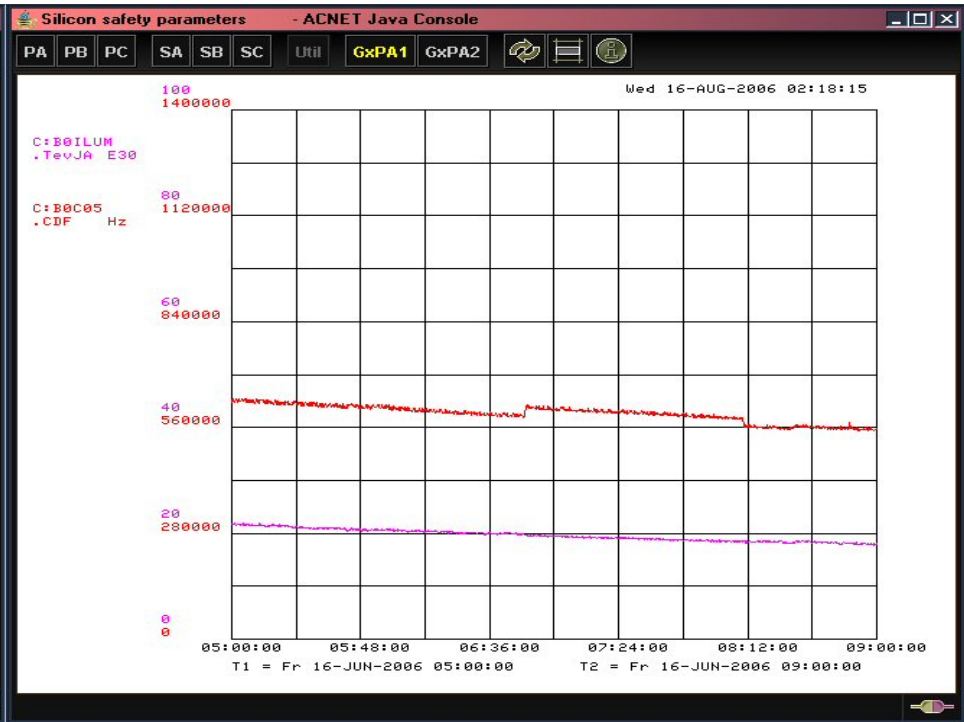
History

- ***During shutdown we replaced all of the PMTs with new ones. New PMTs -> new HV settings -> new CLC acceptances.***
  - Takes few stores to tune to the proper HV settings and have the detector calibrated. Stores 4745, 4759, 4760. Corrections applied offline.
- ***Due to overvoltage settings one channel (ch 28) became unstable.***
  - Impact on integrated luminosity is <5%. Stores 4772, 4774, 4778.
- ***ADMEM hardware problem caused wrong luminosity measurement.***
  - ADMEM turns amplitudes into hits, sent to CPU for online lumi calculation. It is not the only path, before ADMEM signal is splitted.
  - The second path allowed us to correct for the ADMEM failure. Stores affected: 4794, 4797, 4798, 4799, 4802, 4804.

Channel 28 instability

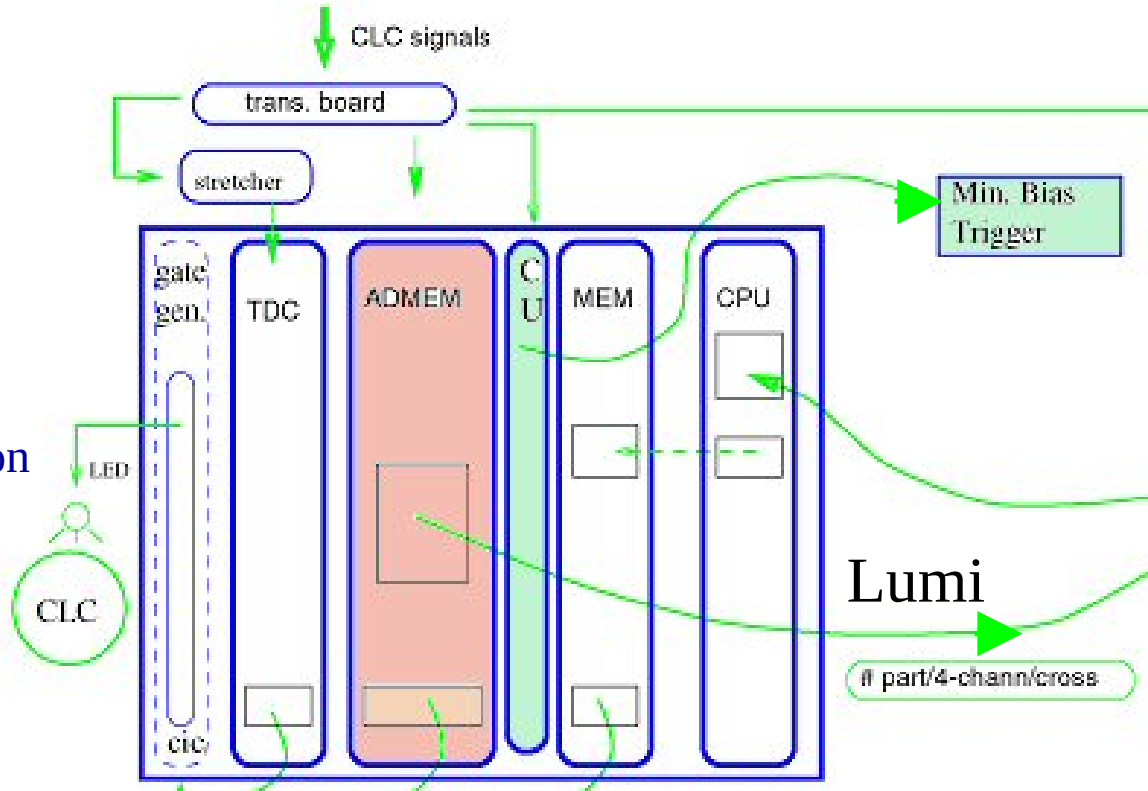
- ***PMT for channel 28 was set at very high HV value ~300V above average (factor ~8 in gain).***
- ***Channel showed 2 state instability which affected the hit rate for the entire West Middle layer (this is how we detected the problem) AND the luminosity.***
  - Luminosity measurement affected only @ high lumi.
- ***Corrected by interpolation on correct measurement***





ADMEM failure recover

- ***Signal from PMT gets splitted in the Transition Board.***
  - One signal path enters the ADMEM, gets digitized, then the FPGAs perform the hit counting used for the Lumi calculation. The FPGAs failed.
  - Another path goes into a Coincidence Unit which produces Minimum Bias Triggers. MB info are saved into log files and sent to AcNet.
    - *Loose: ≥1 East hit*
      AND ≥1 West hit
    - *Tight: ≥2 East hits*
      AND ≥2 West hits
  - MB scales with Lumi.
    From previous good runs we calculate the mapping function and we correct the instantaneous lumi.



Correction summary

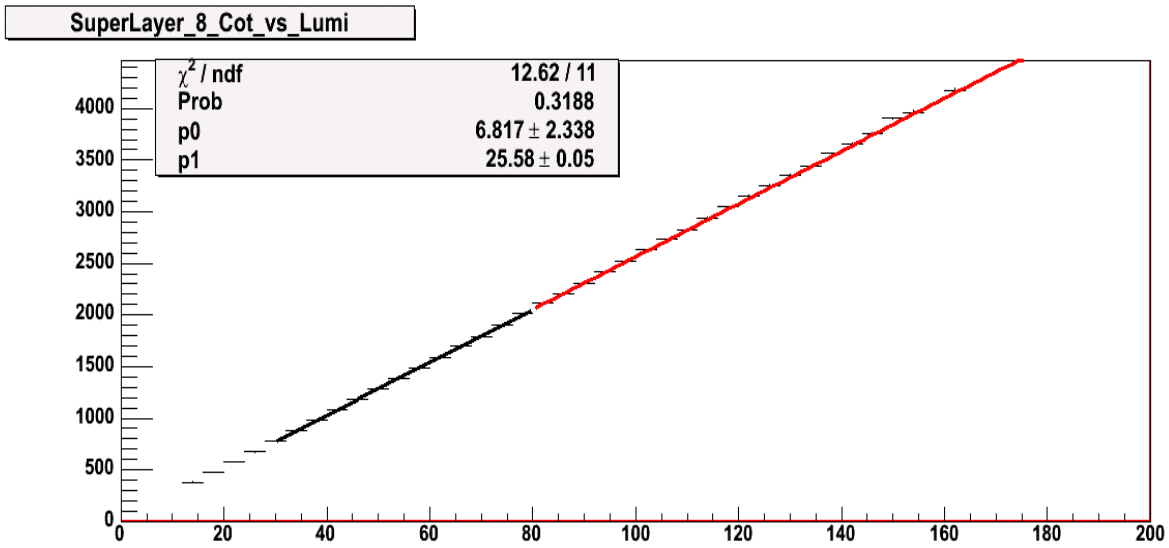
- ***Summary of offline corrections.***

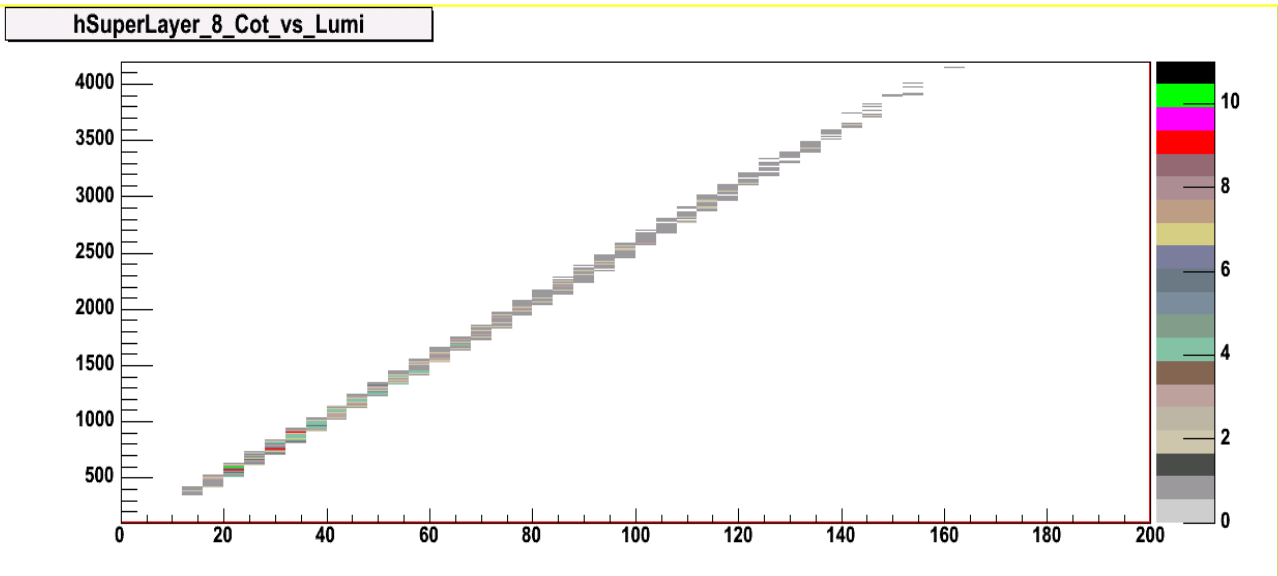
Calibration			
Store	**Corr Integrated L**	**Corr Initial L**	**Corr Final L**
4745	0.78	0.78	0.78
4759	0.78	0.78	0.78
4760	0.78	0.78	0.78

Channel 28			
Store	**Corr Integrated L**	**Corr Initial L**	**Corr Final L**
4772	0.96	1.00	1.00
4774	0.95	1.00	1.00
4778	0.99	1.00	1.00

ADMEM			
Store	**Corr Integrated L**	**Corr Initial L**	**Corr Final L**
4794	0.90	0.83	0.90
4797	1.12	1.13	1.06
4798	1.12	1.12	1.06
4799	1.15	1.12	1.15
4802	0.89	0.95	0.80
4804	0.94	0.92	1.00

COT currents vs CDF





Here we plot:

SL8 VS B0lum

X axes -> Lum[E30cm^{-2}s^{-1}]

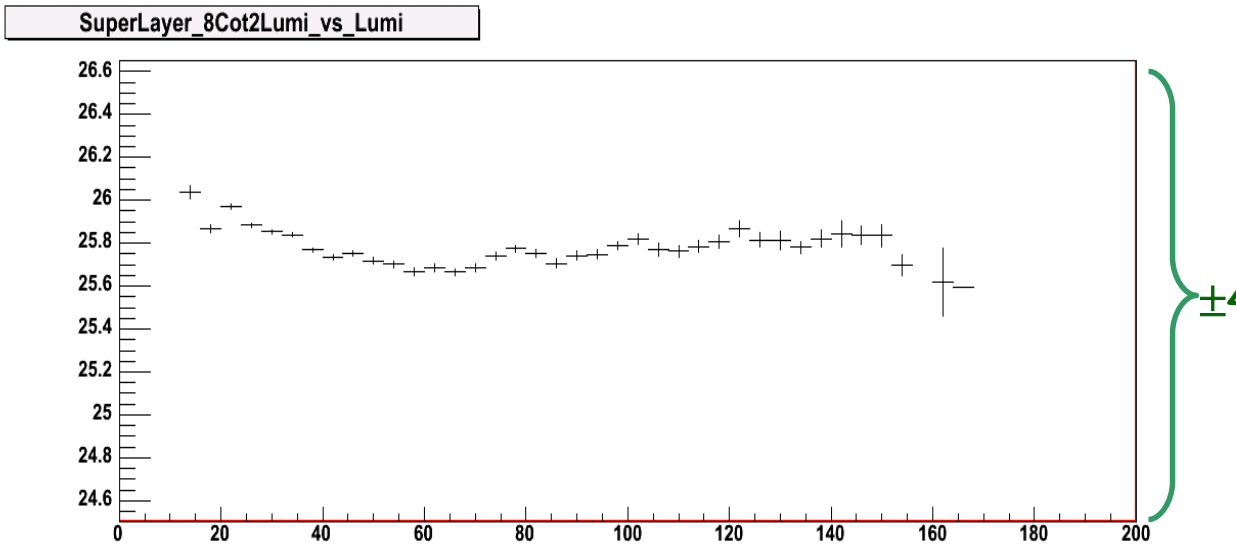
Y axes -> SL8.

First 30mins of each store removed to allow COT warmup.

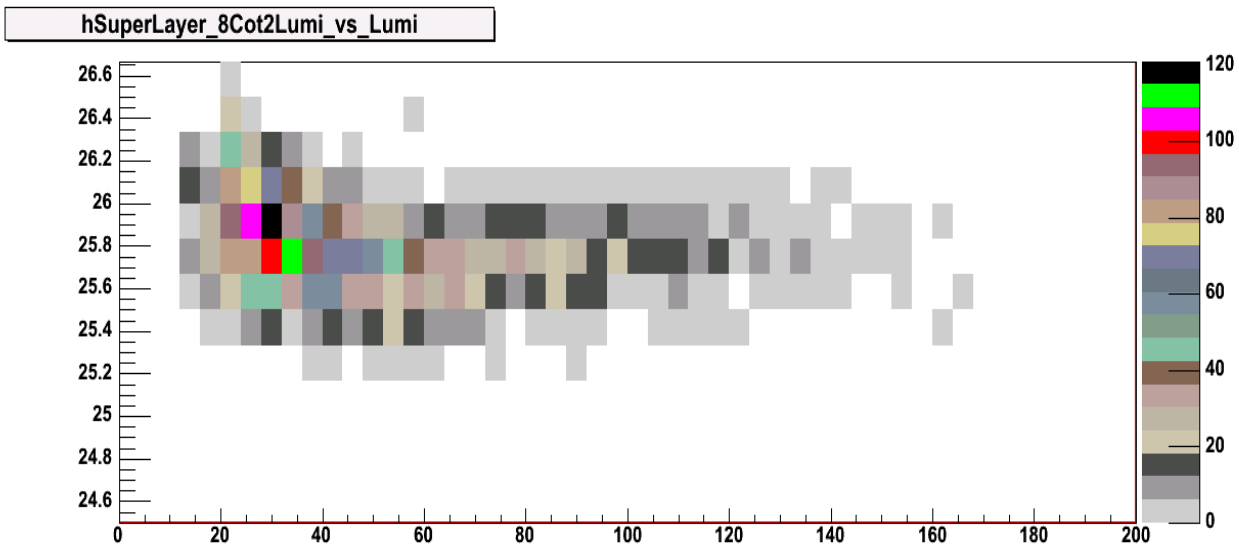
Data: stores 4805-now

(from Jun 30th)

COT currents vs CDF



±4.2%



Here we plot:

SL8/B0lum VS B0lum

X axes -> Lum[E30cm^{-2}s^{-1}]

Y axes -> SL8/Lum. Full range is ±4.2%, the CDF lum uncertainty.

Summary

- Replaced all PMTs during shutdown.
  - *93/96 channels operational*
- Initial calibration after shutdown and minor hardware issues resolved.
- Lumi corrected offline
  - *Uncertainty as quoted*
- COT currents vs Lumi study extended to post-shutdown data
  - *Linear behavior confirmed.*